

Release notes for ENDF/B Development n-099_Es_252
evaluation



April 26, 2017

- fudge-4.0 Warnings:

1. Cross section does not match sum of linked reaction cross sections
crossSectionSum label 0: total (Error # 0): CS Sum.

WARNING: Cross section does not match sum of linked reaction cross sections! Max diff: 0.31%

2. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

Section 1 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [nubar]): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

3. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

Section 2 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [nubar]): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (1.619823e-09) is too small

4. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

Section 3 (total): / Form 'eval': / Component 0 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

5. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

Section 3 (total): / Form 'eval': / Component 1 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

6. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

Section 4 (n + Es252): / Form 'eval': / Component 0 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

7. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

Section 4 (n + Es252): / Form 'eval': / Component 1 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

8. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

Section 6 (n[multiplicity:'2'] + Es251 + gamma): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (9.532212e-09) is too small

9. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 8 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission]): / Form 'eval': / Component 0 (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
10. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 8 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission]): / Form 'eval': / Component 1 (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
11. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 10 (n + (Es252_e1 ->Es252 + gamma)): / Form 'eval': (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (2.782297e-09) is too small
12. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 11 (n + (Es252_e2 ->Es252 + gamma)): / Form 'eval': (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (2.133966e-10) is too small
13. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 12 (n + (Es252_e3 ->Es252 + gamma)): / Form 'eval': (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (1.087765e-09) is too small
14. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 13 (n + (Es252_e4 ->Es252 + gamma)): / Form 'eval': (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (4.158662e-10) is too small
15. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 14 (n + (Es252_e5 ->Es252 + gamma)): / Form 'eval': (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (2.368432e-09) is too small
16. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 15 (n + (Es252_e6 ->Es252 + gamma)): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (1.738721e-09) is too small

17. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 16 ($n + (Es252_c \rightarrow Es252 + \gamma)$): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

18. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 17 ($Es253 + \gamma$): / Form 'eval': / Component 0 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

19. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 17 ($Es253 + \gamma$): / Form 'eval': / Component 1 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

20. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 18 ($n + Es252$ [angular distribution]): / Form 'eval': (Error # 1): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

21. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 19 ($n[multiplicity:energyDependent, emissionMode:'prompt'] + n[emissionMode:'delayed'] + \gamma [total fission] [spectrum]$): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

22. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 20 ($n[multiplicity:energyDependent, emissionMode:'prompt'] + n[emissionMode:'delayed'] + \gamma [total fission] [spectrum]$): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

23. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 21 ($n[multiplicity:energyDependent, emissionMode:'prompt'] + n[emissionMode:'delayed'] + \gamma [total fission] [spectrum]$): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

24. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 22 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed']) + gamma [total fission] [spectrum]): / Form 'eval': (Error # 0): Condition num.

```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

- fudge-4.0 Errors:

1. Duplicate Eout in outgoing distribution
Reading ENDF file: ../n-099_Es_252.endf (Error # 0): Bad Eout

```
WARNING: skipping duplicate e_out = 6351610.0, i1 = 81 0 1e-05
```

2. Energy range of data set does not match cross section range
reaction label 7: n + (Es252_c ->Es252 + gamma) / Product: Es252_c / Decay product: gamma_a / Multiplicity: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (170000.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
```

3. Energy range of data set does not match cross section range
reaction label 7: n + (Es252_c ->Es252 + gamma) / Product: Es252_c / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (170000.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
```

```
WARNING: Domain doesn't match the cross section domain: (300000.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
```

```
WARNING: Domain doesn't match the cross section domain: (234936.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
```

```
WARNING: Domain doesn't match the cross section domain: (400000.0 -> 20000000.0) vs (110882.0 -> 20000000.0)  

... plus 4 more instances of this message
```

4. Energy range of data set does not match cross section range
reaction label 7: n + (Es252_c ->Es252 + gamma) / Product: Es252_c / Decay product: gamma_b / Multiplicity: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (300000.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
```

5. Energy range of data set does not match cross section range
reaction label 7: n + (Es252_c ->Es252 + gamma) / Product: Es252_c / Decay product: gamma_c / Multiplicity: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (234936.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
```

6. Energy range of data set does not match cross section range
reaction label 7: n + (Es252_c ->Es252 + gamma) / Product: Es252_c / Decay product: gamma_d / Multiplicity: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (400000.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
```

7. Energy range of data set does not match cross section range
reaction label 7: n + (Es252_c ->Es252 + gamma) / Product: Es252_c / Decay product: gamma_e / Multiplicity: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (400000.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
```

8. Energy range of data set does not match cross section range
reaction label 7: n + (Es252_c -> Es252 + gamma) / Product: Es252_c / Decay product: gamma_f / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (200000.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
9. Energy range of data set does not match cross section range
reaction label 7: n + (Es252_c -> Es252 + gamma) / Product: Es252_c / Decay product: gamma_g / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (400000.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
10. Energy range of data set does not match cross section range
reaction label 7: n + (Es252_c -> Es252 + gamma) / Product: Es252_c / Decay product: gamma_h / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (300000.0 -> 20000000.0) vs (110882.0 -> 20000000.0)
11. Calculated and tabulated Q values disagree.
reaction label 8: n[multiplicity:'2'] + Es251 + gamma (Error # 0): Q mismatch

WARNING: Calculated and tabulated Q-values disagree: -5726183.365264893 eV vs -5289530. eV!
12. Energy range of data set does not match cross section range
reaction label 8: n[multiplicity:'2'] + Es251 + gamma / Product: gamma_a / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (5500000.0 -> 20000000.0) vs (5310700.0 -> 20000000.0)
13. Energy range of data set does not match cross section range
reaction label 8: n[multiplicity:'2'] + Es251 + gamma / Product: gamma_a / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (5500000.0 -> 20000000.0) vs (5310700.0 -> 20000000.0)
14. Energy range of data set does not match cross section range
reaction label 8: n[multiplicity:'2'] + Es251 + gamma / Product: gamma_b / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (5500000.0 -> 20000000.0) vs (5310700.0 -> 20000000.0)
15. Energy range of data set does not match cross section range
reaction label 8: n[multiplicity:'2'] + Es251 + gamma / Product: gamma_b / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (5500000.0 -> 20000000.0) vs (5310700.0 -> 20000000.0)
16. Energy range of data set does not match cross section range
reaction label 8: n[multiplicity:'2'] + Es251 + gamma / Product: gamma_c / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (5500000.0 -> 20000000.0) vs (5310700.0 -> 20000000.0)

17. Energy range of data set does not match cross section range
reaction label 8: n[multiplicity:'2'] + Es251 + gamma / Product: gamma_c / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)
- WARNING: Domain doesn't match the cross section domain: (5500000.0 -> 20000000.0) vs (5310700.0 -> 20000000.0)
18. Energy range of data set does not match cross section range
reaction label 8: n[multiplicity:'2'] + Es251 + gamma / Product: gamma_d / Multiplicity: (Error # 0): Domain mismatch (a)
- WARNING: Domain doesn't match the cross section domain: (5500000.0 -> 20000000.0) vs (5310700.0 -> 20000000.0)
19. Energy range of data set does not match cross section range
reaction label 8: n[multiplicity:'2'] + Es251 + gamma / Product: gamma_d / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)
- WARNING: Domain doesn't match the cross section domain: (5500000.0 -> 20000000.0) vs (5310700.0 -> 20000000.0)
20. Energy range of data set does not match cross section range
reaction label 8: n[multiplicity:'2'] + Es251 + gamma / Product: gamma_e / Multiplicity: (Error # 0): Domain mismatch (a)
- WARNING: Domain doesn't match the cross section domain: (6000000.0 -> 20000000.0) vs (5310700.0 -> 20000000.0)
21. Energy range of data set does not match cross section range
reaction label 8: n[multiplicity:'2'] + Es251 + gamma / Product: gamma_e / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)
- WARNING: Domain doesn't match the cross section domain: (6000000.0 -> 20000000.0) vs (5310700.0 -> 20000000.0)
22. Calculated and tabulated Q values disagree.
reaction label 9: n[multiplicity:'3'] + Es250 + gamma (Error # 0): Q mismatch
- WARNING: Calculated and tabulated Q-values disagree: -12511906.73770142 eV vs -1.20756e7 eV!
23. Calculated and tabulated Q values disagree.
reaction label 10: n[multiplicity:'4'] + Es249 + gamma (Error # 0): Q mismatch
- WARNING: Calculated and tabulated Q-values disagree: -18533005.76980591 eV vs -1.8096e7 eV!
24. Calculated and tabulated Q values disagree.
reaction label 12: Es253 + gamma (Error # 0): Q mismatch
- WARNING: Calculated and tabulated Q-values disagree: 5914955.279418945 eV vs 6351610. eV!
25. Multiplicity does not match sum of linked product multiplicities!
multiplicitySum label 9: n + (Es252_c -> Es252 + gamma) total gamma multiplicity (Error # 0): summedMultiplicityMismatch
- WARNING: Multiplicity does not match sum of linked product multiplicities! Max diff: 19.38%
26. Multiplicity does not match sum of linked product multiplicities!
multiplicitySum label 10: n[multiplicity:'2'] + Es251 + gamma total gamma multiplicity (Error # 0): summedMultiplicityMismatch

```
WARNING: Multiplicity does not match sum of linked product multiplicities! Max diff: 89.80%
```

27. Calculated and tabulated Q values disagree.
fissionComponent label 0: /reactionSuite/fissionComponents/fissionComponent[@label='0']
(Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 235752922543.5113 eV vs 2.172e8 eV!
```

28. Calculated and tabulated Q values disagree.
fissionComponent label 1: /reactionSuite/fissionComponents/fissionComponent[@label='1']
(Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 235752922543.5113 eV vs 2.172e8 eV!
```

29. Calculated and tabulated Q values disagree.
fissionComponent label 2: /reactionSuite/fissionComponents/fissionComponent[@label='2']
(Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 235752922543.5113 eV vs 2.172e8 eV!
```

30. Calculated and tabulated Q values disagree.
fissionComponent label 3: /reactionSuite/fissionComponents/fissionComponent[@label='3']
(Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 235752922543.5113 eV vs 2.172e8 eV!
```

31. A covariance matrix was not positive semi-definite, so it has negative eigenvalues.
Section 18 (n + Es252 [angular distribution]): / Form 'eval': / LegendreLValue L=1 vs 1
(Error # 0): Bad evs

```
WARNING: 12 negative eigenvalues! Worst case = -7.972925e-05
```

- njoy2012 Warnings:

1. Evaluation has no resonance parameters given
unresr...calculation of unresolved resonance cross sections (0): No RR

```
---message from unresr---mat 9912 has no resonance parameters
copy as is to nout
```

2. In some evaluations, the partial fission reactions MT=19, 20, 21, and 38 are given in File 3, but no corresponding distributions are given. In these cases, it is assumed that MT=18 should be used for the fission neutron distributions.
heatr...prompt kerma (0): HEATR/hinit (3)

```
---message from hinit---mt19 has no spectrum
mt18 spectrum will be used.
```

3. In some evaluations, the partial fission reactions MT=19, 20, 21, and 38 are given in File 3, but no corresponding distributions are given. In these cases, it is assumed that MT=18 should be used for the fission neutron distributions.
heatr...prompt kerma (1): HEATR/hinit (3)

```
---message from hinit---mt458 is missing for this mat
```

4. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (2): HEATR/hinit (4)

```
---message from hinit---mf6, mt 16 does not give recoil za= 99251
one-particle recoil approx. used.
```

5. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (3): HEATR/hinit (4)

```
---message from hinit---mf6, mt 17 does not give recoil za= 99250
one-particle recoil approx. used.
```

6. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (4): HEATR/hinit (4)

```
---message from hinit---mf6, mt 37 does not give recoil za= 99249
one-particle recoil approx. used.
```

7. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (5): HEATR/hinit (4)

```
---message from hinit---mf6, mt 51 does not give recoil za= 99252
one-particle recoil approx. used.
```

8. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (6): HEATR/hinit (4)

```
---message from hinit---mf6, mt 52 does not give recoil za= 99252
one-particle recoil approx. used.
```

9. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (7): HEATR/hinit (4)

```
---message from hinit---mf6, mt 53 does not give recoil za= 99252
one-particle recoil approx. used.
```

10. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (8): HEATR/hinit (4)

```
---message from hinit---mf6, mt 54 does not give recoil za= 99252
one-particle recoil approx. used.
```

11. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (9): HEATR/hinit (4)

```
---message from hinit---mf6, mt 55 does not give recoil za= 99252
one-particle recoil approx. used.
```

12. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (10): HEATR/hinit (4)

```
---message from hinit---mf6, mt 56 does not give recoil za= 99252
one-particle recoil approx. used.
```

13. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (11): HEATR/hinit (4)

```
---message from hinit---mf6, mt 91 does not give recoil za= 99252
one-particle recoil approx. used.
```

14. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (12): HEATR/hinit (4)

```
---message from hinit---mf6, mt102 does not give recoil za= 99253
photon momentum recoil used.
```

15. Evaluation has no resonance parameters given
purr...probabalistic unresolved calculation (0): No RR

```
---message from purr---mat 9912 has no resonance parameters
copy as is to nout
```

- **xsectplotter** Errors:

1. Duplicate Eout in outgoing distribution
(Error # 2): Bad Eout

```
WARNING: skipping duplicate e_out = 6351610.0, i1 = 81 0 1e-05
```